Approach of maximum sustainable yield (MSY) concept to design a sustainable phytoremediation system to improve shrimp pond water quality

Abstract

Maximum Sustainable Yield (MSY) concept was applied to investigate about its applicability in order to assess the potential ability of Gracilaria edulis as phytoremediation agent. Strategy to design a high efficiency of sustainable phytoremediation system is addressed in this paper. Tank cultivation of G. edulis was conducted in tank filled with shrimp pond water for six weeks. The active and inactive biomass for vegetative propagation was numerically partitioned and modified logistic model was consisted of active biomass for propagation. It was clearly confirmed the high applicability of modified logistic growth model (R =0.980) when 2 239.2g of biomass was defined as inactive for propagation. According to the result, MSY was 0.68g/day at 12.02g of active biomass under the experimental condition. The simulated logistic model for biomass growth pattern has well employed with the experimental data (R =0.986). According to these results, it is remarkable to 2 consider propagative portion of biomass to assess the behaviour of phytoremediation agent and to consider MSY concept on G. edulis. The results revealed the significance to propose a sustainable phytoremediation system by this approach, which can be focused on the management strategy to retain maximum efficiency of the system. Thereby, it is suggested to consider three parameters, such as, active biomass ratio, intrinsic growth rate and self growth inhibition effect as strategies to design a sustainable phytoremediation system.